

the season at their disposal. The mosquitoes do their best to render life intolerable, but Mrs. le Blond found them of no trouble except in the valley; the writer, however, remembers one easy rock-climb in an area to the south of Mrs. le Blond's district that became dangerous owing to a flight of mosquitoes, which took advantage of the shelter from the wind to accompany him up the cliff.

The extreme rottenness of the rocks renders the danger of falling stones greater than in Switzerland. The mountains are covered with such a litter of loose stones that, according to the author, it is unsafe for more than three climbers to go on a rope. "Dumkopf! you will have the whole mountain down," is one of Imboden's ejaculations to his son. Mrs. le Blond seems disposed to attribute the superior security of the Alpine rocks to successive climbers having cleared away the loose material. Her testimony throughout the book to the looseness of the rocks,

in the book is its fine series of photographs; the 304 pages of the text are illustrated by seventy photographs, nearly all of which occupy a full page, and the illustrations give an excellent idea of the geographical structure of the country. Some of them confirm the view that this part of Norway is a dissected plateau. The book has, unfortunately, no index and practically no map, for its useless chart of Scandinavia and the Baltic merely indicates the position of the district in which Mrs. le Blond's mountaineering feats were achieved.

J. W. G.

A NATIONAL SCHEME OF AFFORESTATION.

THE Royal Commission on Coast Erosion and Afforestation has issued its second report, which deals with afforestation. If the scheme proposed in this report be adopted, it would mean that in eighty



The Urtind at Midnight. In the background the Faestning and Kjostind. From "Mountaineering in the Land of the Midnight Sun."

and the photographs showing the sharp cones and jagged pinnacles characteristic of the country, suggest that only the lower slopes of the mountains have been glaciated. She speaks of well-rounded glaciated surfaces on the lower ground, and it appears possible, from her descriptions and photographs, that, as has long been well known regarding the Lofoden Islands, the mountains were never completely buried beneath an ice-sheet. Their upper slopes may still wear the débris due to pre-Glacial weathering.

The book gives very little direct geographical information other than details as to the climbing. To mountaineers in the Tromsø district it will be indispensable. There is a short chapter on the Lapps, and much enthusiasm expressed for both Norway and the people. One of the most valuable features

years from its commencement there would be afforested 9,000,000 acres of land at present classed in the agricultural returns as rough mountain land used for grazing. In their investigations the commissioners find that there are no less than 16,000,000 acres not under cultivation or permanent pasture in Great Britain. To this there may be added several million acres of similar land in Ireland. However, much of this land is not suitable even for tree-growth, and may be already used to better advantage. The commissioners find 9,000,000 acres of this land is suitable for afforestation, and they recommend that the State should undertake the task of afforesting that area.

Two schemes, a larger one and a smaller one, are proposed:—First, that the maximum area—9,000,000 acres—should be planted up at the rate of 150,000

acres annually for sixty years, a third of this area to be worked on a forty years' rotation, and two-thirds on an eighty years' rotation. The value of the property in possession of the State at the end of the rotation would be 562,075,000*l.*, or 106,993,000*l.* in excess of the sum involved in its creation, and, allowing 3 per cent. compound interest on the initial capital expended, the annual revenue would be 17,411,000*l.* Secondly, the smaller scheme provides for the afforestation of 6,000,000 acres to be planted at the rate of 75,000 acres annually for eighty years. The value of the property at the end of that time would be 320,000,000*l.*, or 60,944,000*l.* in excess of the cost of production, and would yield henceforth an annual return of 10,000,000*l.*

These figures, it should be mentioned, are based on average estimates of the cost of freehold and planting, as well as the returns from thinnings and final fellings. The experts and witnesses examined by the commission were unanimous in their opinion that the soil and climate of Britain are eminently well suited for the growth of trees and forests. That a shortage exists in the world's supply of timber is a fact which every day makes more apparent. The evidence placed before the commissioners shows that within the last decade the price of timber has increased 30 to 50 per cent., while the quality has decreased. No doubt many substitutes have been invented, but this has not decreased the consumption of timber, and in spite of those many substitutes there are indications that the consumption of timber is increasing. Mention is made in the report of many places where afforestation has been properly conducted in this country, and has yielded handsome returns on the outlay. For this and many other reasons too numerous to quote, the commissioners are satisfied that "with due regard to sound principles and economic management, timber-growing has in this country proved profitable," and that "success in the future with improved methods should be generally assured."

So far, the report thus shows that at present a vast area of what should be valuable productive land in this country is lying practically unproductive, and, if afforestation were started on the lines of the scheme proposed, this land would give employment to 18,000 labourers during the planting season. But forestry on such a large scale is bound to improve and encourage subsidiary industries, and even give rise to new ones which depend upon timber for their raw material. These industries, it is estimated, would absorb an amount of labour equal to that of one man for every eighteen acres of forest, while evidence has been placed before the commissioners that such land as is at present utilised provides employment for one man on 1000 to 2000 acres. This naturally opens up the question as to the possibility of providing work for the unemployed.

The commissioners have made exhaustive inquiries in this direction, and find that for certain kinds of labour involved in afforestation the unemployed have been used with satisfactory results. There is no doubt that the requisite number of labourers could be obtained from the ranks of the unemployed. A great deal depends, however, upon the physical fitness of the labourers so obtained. The commissioners believe that, with a judicious selection and probably a short period of training, many of the unemployed would be quite capable of engaging in the work of planting. It is a difficult question to decide whether the unemployed are suitable for such work. In this connection two problems are involved, viz. provision for the maintenance of our future timber supplies, and the relief of the unemployed. Undoubtedly the present

needs of the unemployed are urgent, but the maintenance of our future timber supplies is equally important, and although the present generation sees the distress caused by unemployment, this would become worse in the next generation should our timber supplies run short.

The whole success of afforestation depends upon the skill and care with which the forests are established. To dig a hole and plant a tree may seem quite simple, but it nevertheless requires a considerable amount of skill. Bad planting has been the ruination in many cases of what should have been at present fine forests. If the unemployed are to be utilised at all, they would have to be subject to a considerable amount of supervision by skilled, practical foresters, and it is not very clear from the report how these trained foresters are to be procured. No doubt there are a good many such men in the country at the present time, but not sufficient to supervise the work of afforestation on such a scale as the commissioners propose. Manual labour is no doubt essential, but the success of the future forests will depend upon the skill with which such labour is directed towards the achievement of the object in view. It must also be kept in mind that a general survey of the country is necessary as a preliminary operation in order that the areas suitable for afforestation may be mapped out and located. After this work would naturally come a detailed survey of the different areas to determine many essential and important matters, such as the suitability of the area for the growth of certain trees, and the preparation of working plans or schemes of management. This work could only be entrusted to well-trained experts. It must be remembered that initial mistakes in silviculture are not only difficult to remedy, but that their effects last over a long series of years—possibly a whole rotation.

In estimating the expense of carrying out a scheme such as they propose, the commissioners seem to have made very little provision for the maintenance of a properly trained forest staff apart from those engaged in manual labour. Although it is quite certain that our soil and climate are capable of producing high-class timber, still we have yet a great deal to learn about silviculture in this country. Comparisons with Germany are useful, but even in Germany local conditions have to be studied, and suitable systems of silviculture and management adopted.

In their report the commissioners state that they have been reminded that "on the Continent large areas of woodland are periodically overrun by destructive insects, whose depredations entail large loss, whereas the most troublesome of these pests are practically unknown in this country." This is very optimistic. We have already a fair share of those insect pests, and, should we ever have large areas of woodlands like the Germans, there is very little doubt but that we shall also have the insects and other attendant evils, such as fungi. These, however, could be kept in check provided proper scientific protective measures are adopted in time.

On p. 41 of the report it is stated that "the afforestation of suitable lands in the United Kingdom, if undertaken on an adequate scale and in accordance with well-recognised scientific principles, should prove at present prices a sound and remunerative investment." It is suggested that, if Parliament should determine to carry out the recommendations proposed, the scheme should be administered by commissioners specially appointed for that purpose. But between those administrators and the working staff comes a gap which can only be filled by the man who knows.

The commissioners, it seems, have not taken this part of the staff into account in drawing up their estimates of working expenses. The forest schools at present in existence in this country, with a little development, would be quite capable of undertaking the scientific training of this very essential part of the staff. For many years past the pressing need for demonstration areas and forest gardens has been urged upon the Government. Had these institutions been in existence now, their value would have been inestimable in indicating the soundest and most economic lines upon which extended afforestation should be carried out.

Coming now to the question of the acquisition of the necessary land, the commissioners recommend that compulsory powers be obtained by legislative enactment whereby proprietors would be forced to sell suitable land should private negotiations fall through. However, certain alternative schemes are proposed. For example, a scheme suggested by Lord Lovat of co-partnership between the private owner of land and the State, the owner to provide the land free of cost, the State to provide the capital necessary for its afforestation, the profits to be shared *pro rata* of their respective contributions, the owner to have the option at any time of buying out the State's interest. Again, it is suggested that the commissioners might be given power to afforest land acquired otherwise than by purchase by special arrangement with the owner, on such terms and conditions as may be approved by the Treasury, provided due security be taken for the continuity of the scheme. Still another plan is suggested, viz. that, if the owner of a surveyed area is prepared to afforest his land in a reasonable time under the supervision, and to the satisfaction, of the Forest Commissioners, compulsory powers of purchase should not be enforced against him. Finally, the commissioners suggest that the existing facilities given to landowners for obtaining loans for planting might perhaps with advantage be increased by extending the time for the repayment of the loan.

There are weighty reasons in favour of these alternative suggestions. In the first place, it would ensure the important cooperation and active assistance of landowners, many of whom are at present engaged in renewing and extending their forest areas, while many others would be willing to do the same should forestry become an established industry. The compulsory acquisition of the necessary areas would be bound to lead to a breaking-up of the existing arrangement of the land, especially as regards the larger sheep farms, and the consequent diminution of the food supplies, especially mutton, would possibly be greater than the 4·81 per cent. at present anticipated. By encouraging private owners to extend their forest areas, and by the gradual purchase of suitable land where available, the State would more slowly, but at the same time with greater certainty, attain the object which the commissioners have in view.¹ Legislative enactment might be directed towards the adjustment of the present railway rates, and the abolition of the tax on afforested areas.

In discussing the cost of plants and planting, the statement made at the top of p. 26, namely, that "if plants are purchased they will probably cost 4*l.* to 5*l.* per acre," does not seem to tally with the evidence, or what immediately follows in the next paragraph.

¹ It would also entail less initial expenditure. Under the present scheme it is proposed to raise the necessary capital by loan, the interest to be defrayed out of taxation. For the full scheme 2,000,000*l.* would be required annually. The net deficit in the first year would be 90,000*l.*, which would increase to 3,131,250*l.* in the fortieth year, after which it is calculated the forest would have become self-supporting.

DR. FRANCIS ELGAR, LL.D., F.R.S.

THE sudden death of Dr. Francis Elgar, F.R.S., at Monte Carlo, on January 16, has deprived the profession of naval architecture of one of its most eminent representatives, and the loss will be felt throughout the world of science, in which he had made many friends. He came of a family which had for generations been connected with the great naval arsenal at Portsmouth, and was himself apprenticed there about fifty years ago. For nearly seventy years the Admiralty has maintained an admirable system of schools for its apprentices, and has provided facilities by which those who prove capable of benefiting thereby shall receive higher instruction in those branches of mathematics which are used in connection with shipbuilding, as well as in the operations and processes incidental to practical work in drawing offices and mould lofts. Elgar was one of the young men whose progress in the school secured advancement to higher instruction. Fortunately for his career, just at the period (in 1864) when he had completed the preliminary stages of training at Portsmouth, it was decided by the Admiralty and Science and Art Department to join forces and to establish the Royal School of Naval Architecture and Marine Engineering at South Kensington. The Admiralty students at this school were selected by competitive examination in which apprentices in all the Royal dockyards took part. Elgar was one of eight young men chosen in this way from a very large number of candidates, and given an opportunity of passing through a three years' course of advanced study in the theory and practice of shipbuilding. This he did with distinction, and was awarded a first-class diploma of Fellow of the Royal School of Naval Architecture in 1867.

Sir Edward Reed—then chief constructor of the navy, and himself a graduate of an earlier school of naval architecture—took a warm interest in the welfare of the graduates from the new school, and appointed Elgar an assistant overseer of the ill-fated turret ship *Captain*, which was then building by Messrs. Laird, of Birkenhead. In the preparation of the design for that vessel, Captain Cowper Coles, R.N., had collaborated with Messrs. Laird, and Admiralty inspection was limited to supervising the work of construction. In this manner Elgar at an early age supplemented practical training obtained in Royal dockyards by close association with the business of a great private shipyard. About two years later he was recalled to Portsmouth, and received an appointment as a shipbuilding officer, being employed on important practical work in that establishment when the loss of the *Captain* took place. The master shipwright of the dockyard was asked to give evidence before the court martial in regard to the stability of the *Captain*. These conditions were altogether exceptional owing to the extremely low freeboard and heavy sail equipment of that vessel. In the preparation of this evidence, Elgar gave considerable assistance to his superior officer, and in this way began a series of investigations into the stability of ships which extended over many years, and covered mercantile vessels of various types, as well as warships.

In 1870 Sir Edward Reed resigned his position in the Admiralty, and established a private practice in London. Elgar became his chief professional assistant in 1871, and took charge of the London office, in which, during the next few years, novel and important designs for foreign warships and for mercantile vessels were prepared. In all these designs, as well as in the supervision of the work of building the ships, Elgar took an important part, and his services were acknowledged by Sir Edward Reed.